beam with two orthogonally polarized frequencies, where the frequency splitting is only very small (e.g., from about 2 to 150 MHz) relative to the central optical frequency of the beam (e.g., 4.74×10^8 MHz for the 633-nm wavelength of a Helium Neon laser). Where the two frequencies are so close to one another, they cannot be said to be "harmonically related." More generally, it appears that the action is confusing the frequency splitting used in heterodyne detection (which commonly involves orthogonally polarized components as in Sommargen) with the harmonically related frequencies used in a dispersion interferometer, as described in Hill, who also uses heterodyne frequency splittings in each of the harmonically related frequencies (see, e.g., col. 49, lines 44-47).

In particular, Sommargren states: "The use of a Zeeman split laser to produce the two optical frequencies is only applicable to certain lasers (e.g., HeNe) and limits the frequency difference between the two optical frequencies to about 2 MHz" (col. 2, lines 5-8). Sommargen goes on to describe the use of an acousto-optical modulator (AOM) (e.g., a "Bragg cell") to produce a frequency splitting larger than that produced by the Zeeman effect: "The principle advantages of the instant invention are: (1) higher, selectable frequency difference between the output beam, e.g., a tunable frequency range of 2-150 MHz vs. 0.6-2 MHz for a Zeeman split laser source..." (col. 4, lines 52-56). Even such large frequency splittings are incredibly small, however, when compared to the optical frequency of the Helium Neon beams, which corresponds to about 0.633 microns, or equivalently, 633 nm (see, e.g., col. 3, line 33 of Sommargren). As is well known, the conversion from wavelength λ to optical frequency ν, is given by $\nu = c/\lambda$, where c is the speed of light and equals 3×10^8 m/s. Thus, 633 nm corresponds to $(3 \times 10^8)/(633 \times 10^{-9})$, which equals 4.74×10^{14} s^{-1}, or equivalently, 4.74×10^8 MHz. In other words, the largest frequency splitting disclosed in Sommargren is still more than six orders of magnitude smaller than the optical frequency of the Helium Neon beams.

Dispersion interferometry, on the other hand, involves two beams with "harmonically related" frequencies. The simplest example is where one beam has a frequency twice that of the other beam, which is equivalent to saying that the wavelength of the second beam is twice that of the first beam. Hill defines the harmonically related frequencies for dispersion interferometry as follows: "The ratio of the wavelengths (λ_1/λ_2) has a known approximate ratio value (l_1/l_2), i.e.,

$(\lambda_1/\lambda_2)\approx(l_1/l_2)$, where l_1 and l_2 comprise low order nonzero integer values" (col.. 49, lines 38-43 of Hill, emphasis added). Thus, for the simple example above, l_1 and l_2 are 1 and 2, respectively.

In contrast, for the two frequencies produced by Sommargren's Bragg cell to meet the equality in Hill requires the integers l_1 and l_2 to be on the order of the ratio of the Helium Neon optical frequency (about $4x10^8$ MHz) to the Bragg cell frequency splitting (about 100 MHz) - thus the integers l_1 and l_2 would be in the millions. Such large integer values are hardly the "low order" integer values defined by Hill and clearly outside of the scope of "harmonically related" frequencies.

Accordingly, we ask that the Examiner withdraw the rejection. In the event that the Examiner finds any of the above unclear, we respectively ask that he contact the undersigned below prior to issuing a further action.

We further note that we did not receive initialed Forms PTO-1449 corresponding to our Information Disclosure Statements of August 12, 1999 and August 30, 2000. We submit copies of those forms with the present response and ask that the Examiner initial the references in each form and return the initialed forms to us in his next communication.

Applicant asks that all claims be allowed. Enclosed is a check for the Petition for Extension of Time fee. Please apply any other charges or credits to Deposit Account No. 06-1050.

Respectfully submitted,

Date: 2/4/02

Marc M. Wefers* for
Eric L. Prahl
Reg. No. 32,590

Fish & Richardson P.C.
225 Franklin Street
Boston, Massachusetts 02110-2804
Telephone: (617) 542-5070
Facsimile: (617) 542-8906

***See attached document certifying that Marc M. Wefers has limited recognition to practice before the U.S. Patent and Trademark Office under 37 C.F.R. § 10.9(b).**